

Summary Report of the World Trade Center Technical Review Panel Meeting

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Office of the Science Advisor
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Prepared by:

Eastern Research Group, Inc.
110 Hartwell Avenue
Lexington, MA 02421

NOTICE

This report was prepared by Eastern Research Group, Inc., an EPA contractor, as a general record of discussion during the ninth meeting of the World Trade Center Technical Review Panel held February 23, 2005, at St. John's University. This report captures the main points and highlights of the meeting. It is not a complete record of all details discussed, nor does it embellish, interpret, or enlarge upon matters that were incomplete or unclear. Statements represent the individual view of each meeting participant, and may or may not represent the analyses or positions of EPA.

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ACRONYMS AND ABBREVIATIONS

3X	three times
CBPR	Community-Based Participatory Research
CEQ	Council on Environmental Quality
CLC	Community-Labor Coalition
COPC	contaminant of potential concern
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
GSA	U.S. General Services Administration
HEPA	high-efficiency particulate air
HVAC	heating, ventilation, and air conditioning
LMDC	Lower Manhattan Development Corporation
MMVF	man-made vitreous fibers
NYC	New York City
PAH	polycyclic aromatic hydrocarbon
ppm	parts per million
QA/QC	quality assurance/quality control
UCL	upper confidence limit
USGS	U.S. Geological Survey
WTC	World Trade Center

EXECUTIVE SUMMARY

After the collapse of the World Trade Center (WTC) and the subsequent release of contaminants into the environment, the U.S. Environmental Protection Agency (EPA), other federal agencies, New York City (NYC), and New York State public health and environmental authorities focused on numerous cleanup, dust collection, and ambient air monitoring activities to ameliorate and better understand the human health effects of the disaster. While these monitoring and assessment activities were ongoing, EPA began planning for a program to clean and monitor residential apartments. Residents impacted by WTC dust and debris were eligible to request federally funded monitoring and/or cleaning of their residences. The cleanup continued into the summer of 2003, by which time EPA had cleaned and monitored 3,400 apartments and monitored an additional 800 apartments.

Since then, EPA convened a technical panel of experts who have been involved with the WTC assessment activities to provide advice on the effectiveness of these and related programs. Tim Oppelt, Director of EPA's National Homeland Security Research Center, serves as the interim chairperson, and Paul Liroy, Professor of Environmental and Community Medicine at the Environmental and Occupational Health Sciences Institute of the Robert Wood Johnson Medical School-UMDNJ and Rutgers University, serves as vice chair. This report summarizes the ninth technical panel meeting in New York City, held at St. John's University in Saval Auditorium on February 23, 2005.

Mr. Oppelt facilitated the meeting and presented the agenda, which consisted of:

- Welcome, Purpose of Today's Meeting, and Opening Remarks
- WTC Community-Labor Coalition Presentation
- WTC Community-Labor Coalition Community-Based Participatory Research Expert Advisory Committee Presentation on Draft Sampling Plan followed by Questions of Clarification from Panel Members
- Update from WTC Signature Subgroup and Panel Discussion
- EPA Presentation on Themes from the Public Comments on the Draft Sampling Plan
- Panel Members' Comments/Perspectives on Draft Sampling Plan and Public Comments Received
- Public Comment Period
- Adjourn

EPA representatives and individual panelists proposed the following key conclusions and suggestions during the meeting:

Comments on the Proposed Sampling Plan

- Several panelists emphasized and EPA agreed that the sampling plan must include a QA/QC protocol and better documentation of sampling methods. A QA/QC plan was anticipated and will be prepared.
- Three panelists requested that EPA "beef up" the statistics in the sampling plan.

- One panelist agreed with the community's concern about exposure to dioxin, proposing that it be considered as a contaminant of potential concern (COPC) because of the amount believed to have been released after 9/11.
- One panelist cautioned against adding COPCs that have not been found in many samples thus far (dioxin, mercury) or that are not a serious hazard (small particles and fibers).
- One panelist noted that it would be difficult to include short fibers as a COPC because of the added difficulty and cost of analysis.

Budget

- EPA confirmed that the current budget is about \$7 million for sampling and cleanup (this is the remainder of FEMA's initial WTC appropriation to EPA).
- One panelist expressed dismay that the panel would be driven by money. Several panelists emphasized that they will continue to be driven by science, but acknowledged that the budget is a near-term reality necessitating that all money be spent effectively.

Extent of Sampling

- Several panelists noted WTC impacts in Brooklyn, and suggested including parts of Brooklyn in phase I sampling and cleanup. Two panelists suggested sampling any parts of Brooklyn that are closer to Ground Zero than Houston St. is to Ground Zero.
- One panelist suggested an extended window of time for sampling, so a resident might be able to opt into the program upon learning that a neighbor's unit is contaminated.
- One panelist suggested that EPA include a protocol for expanding testing and cleanup in neighborhoods where initial samples reveal WTC contamination.
- EPA clarified that aggregate sampling results will be made public, but results from individual units will only be revealed to the occupant(s), due to privacy restrictions.

Building Access

- Christopher D'Andrea explained that the NYC Department of Health can enter residences without a landlord's permission and can enter workplaces if a "public health threat" is declared, but was not sure how this policy might relate to EPA's access.
- EPA reiterated that, as a matter of policy, EPA will not force access to buildings whose owners are unwilling to participate in the sampling program.
- Panelists and members of the community suggested several types of public buildings that could be included in sampling.
- One panelist noted the abundance of sampling data in private hands, suggesting that it would be wise to try to obtain these data. EPA agreed, but cautioned that some parties may be unwilling to share data, and sampling methods are not necessarily consistent.

WTC Signature

- Three panelists noted that they would like a better understanding of the spatial partitioning or gradation of WTC signatures. One panelist specifically raised the question

of vertical gradation. EPA and representatives from the Signature Subgroup indicated that they hope additional data will address these questions.

- Two panelists emphasized the need to consider the collapse and fire signatures separately. Members of the Signature Subgroup confirmed that this is their approach.
- One panelist emphasized that since cleanup depends on the presence of a signature, EPA will have to decide upon an “acceptable” level of confidence in its signature screening.
- Several panelists noted the importance of deciding how much slag wool is sufficient to prove that a WTC signature is present. Panelists proposed several options, including three times (3X) background, statistical tests, and a threshold based on fiber count.
- One panelist noted that the difference between slag wool concentrations in WTC and background samples suggests that the presence of a signature can be determined with roughly 99.9% confidence.
- Several panelists expressed their encouragement with the work done thus far on the WTC collapse signature.
- One panelist expressed reservations about the fire signature, noting that several of the compounds involved are volatile, and he would not expect them to be present now.

Cleanup Criteria

- EPA clarified that all samples will be tested for COPCs and the WTC signature. If a signature is present and one or more COPCs is above cleanup criteria, the unit will be cleaned. All results will be shared with occupants, whether or not a signature is present.
- Two panelists clarified that 3-times background will be a conservative trigger for COPC cleanup because it will be based only on backgrounds that are low. EPA noted that 3-times background is just a multiplier, and has been used successfully in previous studies.
- Several panelists agreed that 3-times background is preferable to extrapolating health benchmarks from air to dust.
- Two panelists agreed that it is important to average different types of samples separately (e.g., ductwork samples versus kitchen counter samples).
- One panelist proposed considering additional factors such as building cleaning history; however, two panelists emphasized that that this additional information would be hard to find and/or incorporate.

Other Issues

- EPA clarified that the issue of building demolition in Lower Manhattan is outside the scope of the panel, and is therefore being handled separately.
- One panelist noted that health outcomes are not within the panel’s charge, but they must still be adequately treated.
- Three panelists specifically urged the panel to “move forward.”

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1. INTRODUCTION

After the collapse of the World Trade Center (WTC) and the subsequent release of contaminants into the environment, the U.S. Environmental Protection Agency (EPA), other federal agencies, New York City (NYC), and New York State public health and environmental authorities focused on numerous cleanup, dust collection, and ambient air monitoring activities to ameliorate and better understand the human health effects of the disaster. While these monitoring and assessment activities were ongoing, EPA began planning for a program to clean and monitor residential apartments. Residents impacted by WTC dust and debris were eligible to request federally funded monitoring and/or cleaning of their residences. The cleanup continued into the summer of 2003, by which time EPA had cleaned and monitored 3,400 apartments and monitored an additional 800 apartments. Since then, EPA has developed a draft sampling plan to study the contamination and recontamination of spaces in lower Manhattan that may have been contaminated by the WTC disaster.

EPA convened a technical panel of experts who have been involved with the WTC assessment activities to provide advice on the effectiveness of these and related programs. Tim Oppelt, Director of EPA's National Homeland Security Research Center, serves as the interim chairperson, and Paul Liroy, Professor of Environmental and Community Medicine at the Environmental and Occupational Health Sciences Institute of the Robert Wood Johnson Medical School-UMDNJ and Rutgers University, serves as vice chair. Members of the panel include representatives from the federal agencies directly involved in the air quality response and monitoring, the NYC Departments of Health and Environmental Protection, and outside experts.

EPA's goals in forming this panel and holding this series of meetings are:

- To provide for greater input on continuing efforts to monitor the situation for New York residents and workers impacted by the collapse of the WTC towers.
- To help guide EPA's use of the available exposure and health surveillance databases and registries to characterize any remaining exposures and risks, to identify any unmet public health needs, and to recommend any steps to further minimize the risks associated with the aftermath of the WTC attacks.

Nine technical panel meetings and one conference call have been held to date:

- March 31, 2004, at the Alexander Hamilton U.S. Customs House
- April 12, 2004, at the Tribeca Performing Arts Center at the Borough of Manhattan Community College
- May 12, 2004, conference call
- May 24, 2004, at Saval Auditorium at St. John's University
- June 22, 2004, at Saval Auditorium at St. John's University
- July 26, 2004, at Saval Auditorium at St. John's University
- September 13, 2004, at Saval Auditorium at St. John's University
- October 5, 2004, at Saval Auditorium at St. John's University
- November 15, 2004, at Saval Auditorium at St. John's University
- February 23, 2005, at Saval Auditorium at St. John's University

This report summarizes the presentations and panel discussions at the February 23, 2005 technical panel meeting. Information on each of these meetings is provided on EPA's Web site (<http://www.epa.gov/wtc/panel>).

1.1 Panel Attendees

The following panel members were not present at this technical panel meeting:

- Jessica Leighton
- Frederica Perera
- Claudia Thompson

Christopher D'Andrea served as an alternate for Jessica Leighton. Mr. D'Andrea is an Environmental Scientist with NYC's Department of Health and Mental Hygiene, Office of Environmental and Occupational Disease Epidemiology. A complete list of WTC expert technical review panel members is available on EPA's Web site (<http://www.epa.gov/wtc/panel/members.html>).

1.2 Purpose and Agenda

The purpose of this technical panel meeting was to:

- Summarize public comments received on the External Review Draft entitled, *Draft Proposed Sampling Program to Determine Extent of World Trade Center Impacts to the Indoor Environment* [October 15, 2004 version] (EPA/600/R-04/169A), and hear comments from individual panel members on the draft sampling plan and the public comments received.

The agenda for this meeting is provided in Attachment A and covered the following topics:

- Welcome, Purpose of Today's Meeting, and Opening Remarks
- WTC Community-Labor Coalition Presentation
- WTC Community-Labor Coalition Community-Based Participatory Research (CBPR) Expert Advisory Committee Presentation on Draft Sampling Plan followed by Questions of Clarification from Panel Members
- Update from WTC Signature Subgroup and Panel Discussion
- EPA Presentation on Themes from the Public Comments on the Draft Sampling Plan
- Panel Members' Comments/Perspectives on Draft Sampling Plan and Public Comments Received
- Public Comment Period
- Adjourn

2. WELCOME, PURPOSE, AND OPENING REMARKS

E. Timothy Oppelt, Director of the EPA National Homeland Security Research Center and Interim Panel Chair

Mr. Oppelt welcomed the participants and introduced himself, explaining that he expects to chair the panel until the incoming EPA Administrator has named a permanent replacement for the

previous Panel Chair, Dr. Paul Gilman, who left his position as EPA Science Advisor in November 2004. Mr. Oppelt expressed his desire to build on previous panel discussions and move the discussion forward at this meeting, with a goal of incorporating input from the community. After summarizing the agenda, Mr. Oppelt reminded panelists that they should offer thoughts as individuals, not necessarily strive to reach consensus. He then proposed that the panel meet next in mid-April to discuss implementation of EPA's plan.

3. WTC COMMUNITY-LABOR COALITION PRESENTATION

Catherine McVay Hughes, Community Liaison

Micki Siegel de Hernandez, Alternate Community Liaison

Ms. McVay Hughes and Ms. Siegel de Hernandez presented a report reflecting the results of a community meeting held on Thursday, February 17, 2005. Ms. McVay Hughes welcomed Mr. Oppelt and expressed the community's hope that the panel would now resume meeting on a monthly basis.

Ms. Siegel de Hernandez outlined the activities of the Community-Labor Coalition (CLC) since the November 2004 panel meeting, including several steps in the implementation of the CBPR program. Since November 2004, the CLC has assembled an independent CBPR Expert Advisory Committee and hired a part-time Community Facilitator Outreach Assistant. On January 18, 2005, the CLC submitted comments on the Draft Proposed Sampling Program to EPA, including a Synthesis Report from the Expert Advisory Committee and recommendations, comments, and questions from the CLC. Ms. McVay Hughes introduced the seven members of the Expert Advisory Committee, who have expertise in several disciplines. Two members, David Carpenter and Paul Bartlett, were present.

Ms. McVay Hughes said that the community remains concerned with the "process," noting that it took nearly two months of negotiations with EPA to reach agreement on the final Statements of Work for the CBPR Expert Advisory Committee. This delay meant that the committee had limited time to review the Draft Proposed Sampling Program. The community is also concerned with the pace of the effort, as the WTC Technical Review Panel has not met since November 2004. Finally, Ms. McVay Hughes reiterated the community's ongoing concern with the demolition of four contaminated buildings, and requested that the EPA WTC Technical Review Panel step in to address this unmet public health need.

The CLC has the following recommendations for EPA's Proposed Sampling Program:

- Sample and clean up toxic indoor WTC contamination as quickly as practicable; do not wait for discovery and validation of a "WTC chemical signature."
- Include Brooklyn and other potentially affected areas in phase I sampling and cleanup.
- Include all sample locations in the cleanup criteria, including "less frequently accessed" locations.
- Include small asbestos fibers (less than 5 microns length) in sampling and cleanup.
- Add mercury and dioxin to the contaminants of potential concern (COPCs) for sampling.
- Consider additional factors in the selection of "representative" buildings for sampling.
- Provide a detailed rationale for the "triggers" (criteria) for cleanup.

- Include a quality assurance/quality control (QA/QC) protocol.

The CLC made the following requests of EPA:

- Provide a written response to the CLC's comments and the CBPR Expert Advisory Committee's report.
- Revise the Draft Proposed Sampling Program based on CLC and Expert Advisory Committee suggestions.
- Post all panelists' and public comments online by March 4, 2005, and provide panel members with copies of all comments.
- As requested previously, provide a written legal memorandum describing the powers of various government agencies to gain access to buildings for purposes related to the proposed sampling program.

4. CBPR EXPERT ADVISORY COMMITTEE PRESENTATION

David Carpenter, M.D., University at Albany

David Carpenter presented a summary of the recommendations of the CBPR Expert Advisory Committee, based upon the committee's review of EPA's Draft Proposed Sampling Program. On the issue of sampling program design, the Expert Advisory Committee made the following recommendations:

- Instead of two phases, EPA should conduct one thorough sampling program covering all areas affected by the plume and fires. The plan should reflect a greater sense of urgency.
- Be sure to collect "background" data following the same methodology for consistency.
- Introduce a statistically random sample design to reduce what Dr. Carpenter suggests would be a bias towards more thoroughly cleaned spaces (e.g. the homes of the most concerned residents) under the proposed voluntary plan. This sample design should consider additional variables like cleaning history, altitude, type of ventilation system, and orientation of windows and air intakes relative to Ground Zero.
- Include a QA/QC protocol.

Dr. Carpenter recognized the desire to find a WTC signature, but expressed several concerns with the complexity of the signature concept. Not only will there be completely separate signatures for the collapse and the fires, he said, but there may also be variations depending on particle size, altitude, and distance from ground zero. As it could take a long time to sort out these complexities, EPA should not allow signature work to delay cleanup. In addition, the panel must resolve the liability issue of what to do with high levels of COPCs not tied to the WTC, but which nonetheless represent a public health hazard.

The Expert Advisory Committee believes that three additional COPCs should be sampled and cleaned up:

- Particulate mercury, which came from switches and fluorescent lights in the WTC collapse. While not found in outdoor samples, particulate-bound mercury has been detected in some indoor samples.

- Dioxins, which are produced by the combustion of plastics. Persistent and highly toxic, they are expensive to measure but might be reasonably assessed with a CALUX assay.
- Fine particles and fibers, which Dr. Carpenter suggests would be more prevalent than long fibers in indoor spaces (relative to outdoor spaces) due to their greater ability to get through windows and ventilation systems. Further, traditional vacuum cleaners do not collect fine particles; they end up recirculating them, increasing the likelihood of inhalation. Fine particles penetrate the lung deeper than large particles do, and small asbestos fibers—while not as toxic as large fibers—are nonetheless toxic, according to Dr. Carpenter.

Dr. Carpenter expressed several concerns about sampling and analytical methods in the Draft Proposed Sampling Plan. First, EPA needs to do more to spell out the sampling protocol and ensure consistency. Second, the proposed MicroVac method will not collect small particles, which EPA should try to collect, and the high-efficiency particulate air (HEPA) method may obscure small asbestos fibers. Instead, EPA should analyze samples by electron microscopy. Third, because the best indicator of WTC contamination may be dust in “inaccessible” spaces, EPA should sample areas such as bends and low-velocity areas in heating, ventilation, and air conditioning (HVAC) ductwork, and consider these results in the criteria for cleanup. Fourth, methods of sampling soft surfaces should be improved and clarified.

Dr. Carpenter expressed the following concerns about the criteria for cleanup:

- The proposed criterion for cleanup, three times (3X) background, is inappropriate because it assumes that all COPCs are equally toxic, which is not true.
- Cleanup criteria do not consider the potential for chemical mixtures to be more harmful than individual chemicals alone (e.g., synergy). Lead and mercury are both neurotoxins, and asbestos has been shown to have synergistic effects with smoking, which produces PAHs.
- Cleanup should not be dependent upon identification of a WTC signature that may be highly variable.
- The proposed plan uses mean values and upper confidence limits (UCLs) to determine whether to clean an entire building. Means and UCLs will not adequately reflect the high levels of COPCs to which occupants of the dirtiest units—who presumably spend most of their time there—may be exposed.

Panel Discussion

In response to questions, Carpenter suggested sampling in areas that satellite imagery identified as being affected by the WTC plume—most notably, several sections of Brooklyn. He also suggested making sure the sampling area includes places where human health effects have already been linked to 9/11 (e.g., higher rates of asthma symptoms following the event).

Morton Lippmann expressed serious concerns about several points raised in Carpenter’s presentation. He felt that it was inappropriate to cause public alarm over synergy, dioxins, and small particles and asbestos fibers—three issues for which he believes there is no credible scientific evidence for concern. Synergism has rarely been demonstrated with low-level

toxicants, and dioxin levels were too low to be of concern immediately following 9/11, he said. He acknowledged that ultra-fine particles pass into the bloodstream, but said that even if there were high concentrations after 9/11, many of these particles would have attached to larger particulates in the air. Lippmann stated that, according to toxicology literature, small asbestos fibers are not a health concern. Carpenter disagreed, citing a recent report to the contrary—although Lippmann disputed the validity of that study. Lippmann concluded by emphasizing that a lot of thought and effort had gone into producing the sampling plan, and he expressed hope that the community would recognize the need to be “realistic” and move forward.

David Newman disagreed with Lippmann’s assessment, noting that EPA had characterized 9/11 as the largest dioxin release in history, and that several nearby buildings were known to be contaminated with dioxins. He also suggested that it might help to have a better framework for discussing questions of synergy, noting the work done in this area for the National Contingency Plan. Newman expressed his interest in hearing more of the CBPR Expert Advisory Committee’s opinions on matters such as statistical validity.

David Prezant agreed that the statistics in the Draft Proposed Sampling Program needed to be “beefed up,” and suggested that EPA clarify that confidence levels are used to make conclusions about whole buildings, not individual units. He also suggested that if the two technical reviews had merged their efforts to some extent, it might have improved communication and community buy-in. However, he noted that the panel had already compromised with the community by adding lead as a COPC, and suggested that it may be inappropriate to bring up synergy because there is no accepted way to interpret it for cleanup.

Paul Lioy sought to find common ground with the community’s expert panel, noting that if EPA could provide the collection efficiency curve for their HEPA filters, it might help clarify the issue of small particles. Carpenter agreed that this would be helpful. Lioy also emphasized the importance of the WTC signature for the sake of scientific credibility, which Carpenter agreed was at least a rational desire. Prezant observed that the presence of the signature might also be the only way to convince Congress to fund the cleanup. Lioy said that he realized the sampling plan was still “fuzzy” in some areas.

Jeanne Stellman echoed Prezant and Lioy regarding the need to clarify parts of EPA’s Draft Proposed Sampling Program, particularly the explanation of what “background” levels of COPCs really represent. She also observed that the purpose of the panel was still not entirely clear. Tim Oppelt replied that that the panel’s purpose is to find the extent of WTC contamination and figure out what to do about it. Issues of building demolition will be handled separately by EPA Region 2 in conjunction with the Lower Manhattan Development Corporation (LMDC).

Prezant noted that there are other areas that also fall outside the panel’s domain, most notably, dealing with health outcomes. He emphasized that, regardless of whether COPCs or the WTC signature are found in an individual’s home or work unit, it is imperative that his or her health outcomes be treated appropriately.

In encouraging the panel to move forward and remain “realistic,” Prezant noted that all sampling and cleanup currently must come from a single limited budget. Thus, as much as the panel might want to expand sampling to new areas like Brooklyn, it would be irresponsible to spend too much money on sampling and leave nothing for cleanup. Oppelt confirmed that the budget is currently \$7 million, which, as Joseph Picciano explained, was what remained of the Federal Emergency Management Agency’s (FEMA’s) initial WTC appropriation to EPA. In response to a question from Newman, Pat Evangelista of EPA noted that, by comparison, EPA’s initial WTC residential cleanup cost about \$30 million. Stellman expressed her concern that the process remain driven by science and not by money; Oppelt concurred, but pointed out that the budget limitation was at least a near-term reality, so it would be important to consider how to use resources as efficiently as possible.

Oppelt asked Carpenter how he would improve sampling to reduce bias. Carpenter replied that the community would like to know about EPA’s legal authority to access buildings for sampling. He also urged the panel to resolve the issue of liability, noting that landlords might be reluctant to allow sampling if it could reveal contaminants (e.g., a lead paint hazard) that the landlord might be responsible for removing. Conversely, Newman suggested that voluntary sampling might end up biased towards dirty buildings where occupants have the biggest incentive to want an EPA cleanup. Steven Markowitz agreed that random sampling would be better, but noted that even a random selection plan will still end up with biases as long as the “selected” buildings still have the option of whether or not to participate.

To improve access, Carpenter suggested sampling public buildings like schools to start, and McVay Hughes added that the preponderance of government buildings downtown might also improve the access rate, although Oppelt suggested that EPA might not be able to force other agencies to allow sampling. Oppelt also noted that EPA has a database of building ages, but cleaning histories might be harder to document.

On the issue of background levels of COPCs, Lioy assured Carpenter that the 3X factor would only be based on low background levels; anything that seemed high would automatically not be considered background. Thus, the community should feel confident that 3X background will also be low and protective of human health. Sven Rodenbeck clarified that the 3X factor is not related to the toxicity of any particular compound; it is just a multiplier. He emphasized that this approach is still better than trying to estimate dust benchmarks from human health benchmarks for air.

Markowitz asked why the community Expert Advisory Committee wanted to include dioxin as a COPC, even though a 2002 EPA study had found high dioxin concentrations in only a handful out of 263 apartments in Lower Manhattan. Carpenter explained that dioxins are extremely toxic and were undoubtedly formed as plastic burned at Ground Zero. Paul Bartlett added that dioxin would be a good marker of several other organohalogens that are also produced in fires, and also absent from the current sampling plan.

Several panelists discussed the issue of small fibers. Stellman asked whether it would cost significantly more to count short fibers when EPA was already planning to count long fibers. Lippmann replied that although short and long fibers are indeed collected together in the

membrane filter sampling method, it is harder to count short fibers because this requires greater magnification (electron microscopy, which is more expensive than light microscopy). Further, because short fibers are usually much more prevalent than large fibers, more total fibers will have to be counted in order to get an accurate sense of the concentration of large fibers in the sample. Mark Maddaloni reported that EPA has actually found short:long asbestos fiber ratios of 2:1 indoors and 4:1 outdoors.

5. UPDATE FROM WTC SIGNATURE SUBGROUP

*Jacky Rosati, Ph.D., EPA National Homeland Security Research Center
Greg Meeker, U.S. Geological Survey (USGS) Research Geologist*

Jacky Rosati presented a general update on the progress of the WTC signature subgroup. She noted that the group is currently working on two distinct signatures: one for the WTC collapse, and one for the subsequent fires. The primary component of the collapse signature is slag wool, a glass fiber found in the WTC's spray-on fireproofing. If slag wool and other related components are not present, it should indicate the absence of WTC dust. The fire signature is based on mass fractions and ratios of nine polycyclic aromatic hydrocarbons (PAHs); recent work by Joachim Pleil (EPA) has shown that these ratios will vary depending on the type of fire that created the PAHs. Thus, WTC dust can be differentiated from PAHs that may have originated from a fireplace or other household source. Dr. Rosati said that both the collapse and fire signatures have been successful in testing thus far.

Dr. Rosati outlined the remaining steps in the signature validation process, which are as follows:

- Step 1: Sample collection. The group has already collected "known WTC dusts" from the contaminated buildings at 4 Albany St. and 130 Liberty St. (Deutsche Bank). The group is currently collecting background samples from the greater NYC area; it expects to finish this work by March 1, 2005.
- Step 2: Background confirmation. Background samples will be analyzed to ensure that WTC screening components (i.e., slag wool and PAHs) are not present at levels that would prevent the use of signature screening methods. Samples should be prepped and distributed to labs for confirmation by March 15, 2005.
- Step 3: WTC dust dilution. If the validity of background samples is confirmed, these samples will be "spiked" with three different amounts of known WTC dust in order to test the sensitivity of screening methods.
- Step 4: Validation. Spiked and non-spiked background samples will be sent to commercial labs to test whether they can accurately differentiate between background and "spiked" samples. Dr. Rosati indicated that there will be two sets of labs: one for the collapse signature, and one for the fire. She said she hoped to have samples distributed to the labs by April 15, 2005, with final results expected by May 31, 2005.

After a break for questions from the panel (documented below under "Panel Discussion"), Greg Meeker presented additional details about the collapse signature. Mr. Meeker said that USGS collected 37 dust samples from Lower Manhattan in the days following 9/11. Samples were taken from a variety of locations, including one from a 38th floor unit (a member of the audience said "40th"). Although the samples were limited in time and scope, Mr. Meeker indicated that the

results were relatively consistent across all samples, leading him to believe that the signature would not differ greatly by distance or elevation.

To demonstrate the effectiveness of the collapse signature, Mr. Meeker compared the results of six background samples from Manhattan (north of 70th St.), Brooklyn, and Queens with the weight percentage of slag wool in “indoor WTC dust.” While known WTC dust had at least 100,000 to 200,000 parts per million (ppm) slag wool, the highest background sample had only 56 ppm, the equivalent of just six fibers. Other background samples had no more than one slag wool fiber. Mr. Meeker emphasized that these are preliminary results, but nonetheless suggested that it showed a clear difference between WTC and non-WTC dust.

Mr. Meeker explained that microscopic analysis takes 30-60 minutes per sample, with additional time to analyze the chemical composition of the fibers. Slag wool fibers are large and easy to spot, and it is possible to calculate the weight percentage of slag wool because the sampling method involves the collection of a known mass of dust. Mr. Meeker said he would post the preliminary results on the USGS website by the end of the week.

Panel Discussion

Questions for Dr. Rosati

McVay Hughes asked why “background” sampling was taking place as far south as 70th St., noting that she could smell the WTC as far north as 86th St. in the days following 9/11. Rosati replied that the group will confirm whether every background sample is truly “background,” which will also help to indicate the true extent of WTC contamination. Liroy emphasized that McVay Hughes was probably referring to the smell of the WTC fire, underscoring the need to consider the collapse and fire signatures separately. Rosati agreed on this point.

Newman said he would like a better definition of the signature, as well as a better indication of how signatures might be partitioned over time and space. Stellman expressed a desire to know how sensitive the screening methods would be. Rosati replied that she hopes to be able to answer these questions once further sampling, “spiking,” and validation have been completed. In response to a query from Liroy, Rosati revealed the three levels of “spiking” that will be used to test screening sensitivity: 50%, 25%, and 10% WTC dust.

Stellman inquired about the level of confidence in screening methods, noting that policy decisions (i.e., whether to clean up) require that decisions first be made about what level of screening mistakes is acceptable, or “how good to be.” She noted that such decisions require knowledge of sample size, standard deviations, and other parameters. Oppelt suggested that Stellman include some sample confidence calculations in her follow-up report to the panel. Rosati said that more numbers would be forthcoming, but pointed out that she would expect to see a bias towards false positives, since slag wool and PAHs do come from sources other than the WTC.

Questions for Mr. Meeker

Prezant asked Meeker to clarify the origin of the “WTC dust” samples that showed 100,000 or more ppm slag wool. Meeker explained that they were individual point-counted samples from Lower Manhattan, although he could not recall the exact geographic distribution.

Marc Wilkenfeld asked how Meeker could be sure that the absence of slag wool in a sample means no WTC dust is present. Meeker replied that he has a “fair amount” of confidence, given that he has not observed any substantial fractionation of components over time and space. In response to a question from Prezant, Meeker also said he expected even the lowest level of “spiking” to lead to detection of WTC slag wool. Wilkenfeld pointed out that it would help to have numbers, rather than just a “fair amount” of confidence; Meeker agreed, but said he did not yet have final numbers to report.

To answer Wilkenfeld’s question, Lioy offered a rough calculation of confidence based on the large difference between slag wool concentrations in background samples and WTC samples thus far. He noted that, if 100,000 ppm was the average slag wool concentration in WTC-contaminated samples, and 30 ppm was the average background concentration, then even 3X background would be a very conservative cutoff for making the decision that a signature is present. This approach would offer 99.9% confidence that the correct decision will be made. Lippmann added that if signature screening were to miss any WTC dust, it would be in units with the lowest concentrations anyway.

Lippmann inquired about the size of the slag wool fibers Meeker found in his “WTC” samples. Meeker replied that, thus far, fibers have generally been in the range of 5-10 microns in diameter, similar to those installed in the WTC. He added that WTC slag wool can be visibly distinguished from standard household (pink) insulation.

Newman asked about the ratios of different components in the dust, and whether establishment of a signature would rely upon identification of any components other than slag wool. Meeker said that USGS has found fairly consistent ratios thus far, with asbestos in the 10ths of a percent, slag wool in the 10s of percents, and lead in the ppm range. However, he suggested addressing this issue at the next panel meeting, once more data are available. Rodenbeck asked if USGS had thought of including minerals in the signature; again, Meeker said more data would be forthcoming. However, Meeker did suggest ruling out gypsum and concrete, which are high in background dust samples, suggesting that background would obscure any gypsum or concrete from the WTC.

Stellman expressed concern about the use of signature “proportionality” to determine the degree to which WTC contamination may be present. Markowitz questioned adding proportionality as a new variable, suggesting that it would not hold up at low levels of slag wool. Several panelists replied that the slag wool signature would simply indicate whether or not the unit was affected by WTC dust – a yes/no decision.

Newman stated his belief that, before any data interpretation can take place, EPA must first have a good definition of the signature and the criteria for deciding whether a signature is present.

McVay Hughes inquired about the efficiency of HEPA vacuums that may have been used to clean homes and offices thus far. Lippmann explained that HEPA filters work in a way that enables them to collect both large and small particles, including slag wool and small asbestos. For particles about 0.3 microns in diameter, collection efficiency is 99.97%. Anything larger or smaller than 0.3 microns will be collected with greater than 99.97% efficiency.

6. EPA PRESENTATION ON THEMES FROM PUBLIC COMMENTS

Matt Lorber, EPA Region 2

To provide some background, Mr. Lorber began by chronicling EPA's involvement in the WTC cleanup. Through a voluntary program that lasted from March 2002 to June 2003, EPA tested air in 4,200 apartments for asbestos. If the concentration exceeded 0.0009 structures/cc, EPA provided professional cleaning or re-cleaning funded by FEMA. A total of 3,400 apartments were cleaned. EPA also collected roughly 1,000 pre-clean wipe samples in 263 apartments and analyzed these for 24 contaminants, including dioxin, lead, mercury, and other metals. Mr. Lorber noted that lead levels were highly correlated with building age.

Following a decision by Council on Environmental Quality (CEQ) Chair James Connaughton in October 2003, EPA formed the WTC Expert Technical Review Panel to study issues of "recontamination" and related health effects. Between March and November 2004, EPA developed the Draft Proposed Sampling Program. The current draft incorporates several suggestions from panelists and the public, including the idea of evaluating the extent of *remaining* contamination and the notion of a "WTC signature" rather than simply asbestos as a surrogate for WTC dust.

Mr. Lorber presented a synopsis of the public comments EPA received regarding the Draft Proposed Sampling Program. He grouped the comments into the following points for the panel to discuss:

- *Title and objectives.* The title and objectives do not specify the geographic extent of sampling, the "adequacy" of cleanup, or the fact that analysis is included as well as sampling.
- *Geographic extent.* The sampling protocol does not cover all areas likely affected by the WTC collapse and fires.
- *Sample selection.* Voluntary participation will lead to biased sampling; instead, buildings should be selected on a statistically random basis, and then participation of the building should be sought.
- *List of COPCs.* EPA's selection of COPCs relied too heavily on outdoor data. EPA should have included dioxin, mercury, and smaller particles that are more easily able to get into indoor spaces.
- *Sampling methods.* EPA has specified that it will use HEPA to collect asbestos, silica, and man-made vitreous fibers (MMVF), and wipes to collect PAHs and lead. However, EPA needs to make sure it samples both hard and soft surfaces, and must specify what those surfaces will be rather than leave it up to a decision in the field. [In response to this public comment, Mr. Lorber noted that EPA has also discussed using a MicroVac for sample collection. He noted that the combination of air and wipe sampling in the current proposal represents the most cost-effective way to sample all five COPCs.]

- *HVAC*. The sampling plan should place a higher priority on sampling HVAC systems and provide more details about how such sampling will take place.
- *When to clean*. Cleanup should occur soon, and should occur wherever COPCs are measured above criteria, even in the absence of a WTC signature. Results from “inaccessible” areas must be considered in the decision.
- *COPC cleanup criteria*. The 3X background approach for asbestos, silica, and MMVF is not adequately justified and may be inappropriate.
- *Building cleanup criteria*. Decisions must include building-specific factors and not be based solely on the upper confidence limit on the mean COPC level in a building.
- *Additional decision points*. If samples show that a unit must be cleaned, EPA should consider extending sampling to other units in the building and other buildings in the neighborhood. Phase II should include a larger geographic area than phase I.
- *WTC signature*. The signature could differ as a function of distance, particle size, etc., and there could be other sources of the chemicals of interest. A signature study would need to be peer-reviewed, thus further delaying the sampling program.
- *Background sampling*. Background sampling is critical, and sampling methods must be identical to those used in the impacted area.
- *QA/QC*. The Proposed Sampling Program needs a QA/QC plan.

Panel Discussion

Geographic Extent

Wilkenfeld asked whether EPA had done any testing in Brooklyn, noting that cars in Brooklyn Heights and Park Slope were coated with dust as a result of the WTC collapse. Several members of the audience added that Brooklyn was downwind of the debris plume. Mark Maddaloni of EPA replied that Region 2 did sample some dust and air for asbestos after 9/11, but did not do a full characterization of WTC contamination in Brooklyn. He added that EPA did not find much asbestos in the samples.

Newman emphasized that it is critical that Brooklyn be sampled, if not in phase I, then in phase II. He suggested sampling in Red Hook and Brooklyn Heights at a minimum. Lioy suggested that, since Houston St. has been proposed as a northern boundary for sampling, it would make sense to sample any parts of Brooklyn that are closer to Ground Zero than Houston St. is to Ground Zero. Markowitz suggested sampling within a circle whose radius is equal to the distance from Ground Zero to the point where Houston St. approaches the East River.

Prezant cautioned against diluting the sample, noting that geographic expansion could jeopardize the scientific validity of the sample. Picciano suggested shifting some sampling intensity across the river, rather than reducing intensity. Stellman cautioned that there are still other factors to consider, such as ambient air pollution in areas with high truck traffic.

A member of the audience expressed his concern that there was no scientific basis for choosing Houston St. as a boundary (according to Dr. Gilman), and noted that, at a previous panel meeting, an expert testified that health impacts up to 5 miles from Ground Zero have been statistically linked to 9/11.

Sample Selection

Markowitz stressed the importance of resolving the issue of EPA's authority to enter buildings. Oppelt replied that EPA will not force people to participate; it will be a voluntary program.

Newman asked what recourse tenants would have if they wanted to participate but their landlord refused. Christopher D'Andrea noted that the Health Department may enter a residential space if invited by the tenant, but cannot enter work spaces uninvited unless a "public health threat" has been declared. However, he was not sure how these policies relate to EPA's access.

Stellman asked whether the U.S. General Services Administration (GSA) might be able to grant access to government buildings. David Marciniak of the GSA, who was in the audience, replied that GSA has already provided some samples, but like any landlord they must coordinate access with their tenants. Members of the audience suggested other public buildings that could be sampled, including public schools, libraries, and city housing complexes.

Following an audience member's suggestion that the NYC Department of Education might have samples it could share, Newman suggested a more concerted effort to obtain data currently in the hands of other agencies or private entities, including sample results and building cleaning histories. Krish Radhakrishnan noted that the city had already tried to request data from building owners, and only 300 of 1,000 replied—although an audience member pointed out that an enforcement memo signed by Governor Pataki could have improved the response rate. Maddaloni said that EPA had tried to obtain private data while developing the COPC benchmark document in 2002, but much of it was not shared because of business confidentiality. He also said that different parties might have conflicting data sets, noting that in Deutsche Bank's legal battle with its insurance company, each side collected data to try to make its case in court. Newman replied that it would still be helpful to have all the data, as long as differences in sampling methods are duly noted; Prezant suggested focusing on the most common methods. Meeker said he does not believe any independent samples were analyzed for slag wool.

HVAC

D'Andrea raised a concern about the proposed sampling of air filters. Because filters are routinely changed and their efficiencies vary, sampling might be rather inconclusive. Dennis Santella (EPA) acknowledged that these are realistic concerns, but emphasized that filter sampling might still provide a useful "bulk idea." D'Andrea asked about reporting units; Santella said it would simply be a measure of loading.

When to Clean

Citing the community's concern about basing cleanup decisions on the presence or absence of a WTC signature, Oppelt asked the panel to suggest alternative cleanup criteria. Picciano explained that the initial FEMA/EPA cleanup took place within a defined geographic area. Noting the limited budget, Lippmann cautioned against a first-come, first-served cleanup that might cause money to run out before some of the most adversely affected individuals have been

helped. Rodenbeck agreed that in his opinion, given the panel's mission to deal with remaining WTC contamination, the signature was still the most appropriate way to proceed.

Markowitz suggested that perhaps if COPCs are found above 3X background, one could assume that it is an indication of "WTC contamination" unless an alternative source can be identified. However, Lioy cautioned that this approach could take a lot of time given the ubiquitous nature of several COPCs. Prezant observed that the issue basically boiled down to a question of how a limited budget can be best spent to improve public health. McVay Hughes agreed that as a resident, she would rather "know for sure" from a few samples taken in "inaccessible" places, instead of having a big, intrusive study in her home.

COPC Cleanup Criteria

In response to questions from panelists, Maddaloni clarified that 3X background is a statistical approximation of significance, which EPA has used in past cases of hazardous materials where the database was not large enough to support more complex statistical tests. Lorber added that 3X background will not be used for lead and PAHs because these substances already have established health benchmarks, which EPA will use as cleanup criteria.

Prezant and Lioy expressed satisfaction with 3X background because it is conservative and far less uncertain than attempting to calculate dust health benchmarks with a "k-factor." Siegel de Hernandez agreed, explaining that the community recognizes the limitations of the "k-factor" and the inappropriateness of air sampling at this point. She said that the community's main concern was just that the rationale for 3X background be spelled out.

McVay Hughes and Stellman asked EPA to clarify the sample testing protocol. Evangelista said that samples will be tested for both the WTC signature and the five COPCs. Cleanup will occur if the signature is present *and* one or more of the COPCs is above the criteria for cleanup (e.g., 3X background). This cleanup will be a "full" cleanup in that it will aim to remove all COPCs, not just the one or two that may be above the cleanup criteria. All results will be shared with the occupants of the unit, even if no signature is found. EPA also confirmed that they would not make assumptions based on proportionality of COPCs.

Building Cleanup Criteria

Lippmann stated that he does not believe there is any practical way to address the "other factors" that some members of the community might want to include in the decision of whether to clean a building. McVay Hughes noted the importance of averaging similar samples when making cleanup decisions; for example, HVAC samples should be averaged separately from kitchen counter samples, since they represent different levels of accessibility. Lioy said that averaging would definitely be kept separate, but McVay Hughes and Stellman both pointed out that this was not explicit in the Draft Proposed Sampling Program.

Additional Decision Points

McVay Hughes proposed an extended window for testing, such that one could opt into the program after finding out that a neighbor had a positive test result—or a positive experience. Newman added that the panel should develop a protocol for expanding testing to buildings near a building found to be contaminated. Markowitz noted, however, that there is a trade-off between clustering and well-distributed samples.

An audience member asked whether neighbors will be notified of a unit's test results. Pat Evangelista said that EPA will have to abide by privacy agreements and only disclose individual results to the occupant(s) of the unit tested. However, aggregate results will be made public.

WTC Signature

Noting the large difference between levels of slag wool in background and “known WTC” dust, Siegel de Hernandez asked what concentration of slag wool will be the cutoff for declaring that a signature is present. Meeker agreed that this was an important question, but said he would like to see more data first. Maddaloni suggested that additional data might allow a statistical test to determine the presence of a “significant” deviation from background levels of slag wool. Lippmann suggested that, alternatively, EPA could use a simple cut-off based on the number of fibers present (concentrations are not important because slag wool is too large to get into the lungs, and thus not a health hazard itself). He asked Meeker how many fibers would constitute statistical evidence of “excess;” Meeker replied that at least for asbestos, the presence of four fibers suggests contamination. Stellman noted that EPA and USGS will need to decide how many samples to draw for these analyses.

In response to an audience member's concern about the limited geographic extent of the signature study thus far, Meeker said that it might be possible to model the dispersion of slag wool, although he had not yet seen evidence of fractionation. Lippmann agreed that it would be nice to know more about the spatial gradation between the very high slag wool concentrations near Ground Zero and the low backgrounds elsewhere in the city.

Meeker suggested that EPA may occasionally find high levels of slag wool unrelated to WTC. He expressed interest in finding out how often such false positives might occur.

Prezant wondered whether the signature might be akin to opening a Pandora's box. Maddaloni agreed that it was complicated but still useful. He also noted that slag wool is a de facto measurement of one COPC anyway (MMVF), although Lippmann reminded the panel that slag wool is not itself a health concern.

Lioy suggested that, to get a true sense of the sensitivity of the signature screening method, it would be better to spike samples with as little as 1% WTC dust, rather than 10%.

Stellman said that she would like to see a list of the locations sampled for the signature study; Oppelt agreed that this would ultimately be important information.

Background Sampling

Siegel de Hernandez asked how background samples are currently being taken, noting that the Draft Proposed Sampling Plan does not clearly spell out the protocol. Oppelt agreed that details will need to be clarified. Maddaloni said that the process involves collecting backgrounds for each of the five COPCs, accounting for building-specific factors where necessary. However, Lippmann cautioned that COPC background testing will be hard to do, particularly as EPA confronts the issue of lead, which is highly variable from one building to the next. He warned against including dioxins, which are produced by fireplaces and other background sources.

Prezant asked whether any work had been done on the issue of vertical gradation, and Peter Gautier wondered if EPA's previous study might be any help in this regard. Maddaloni replied that the previous study was limited in scope and methods and did not deal with commercial spaces or vertical gradation. Yet he suggested that it was at least a starting point.

Other Issues

Stellman raised the question of the four buildings slated for demolition, arguing that because they contain (and have the potential to spread) WTC contamination, they are technically within the scope of the panel's charge. Oppelt disagreed, arguing that the demolitions were not within the panel's charge and were being dealt with separately.

Lippmann expressed his desire that the labs doing signature work expedite the process, so that additional samples can be taken in "intermediate" areas that might provide better insight on the spatial gradation of the signature. He said he was encouraged with the progress on the collapse signature, but expressed some concern about the volatile/semi-volatile nature of some of the materials proposed for the fire signature, which he doubts would remain in dust for this long. He suggested revisiting this as well as the COPC background testing at the panel's next meeting.

Stellman reminded the panel of the importance of the written comments that each member will submit following the meeting.

7. PUBLIC COMMENTS

A public comment session was held from 4:00 p.m. to 5:07 p.m. (scheduled from 4:00 p.m. to 5:00 p.m.). The following members of the public made comments to the panel during this period:

- Ann Arlen
- Lisa Baum
- Maria Cifuentes
- Marjorie Clarke
- Diane Dreyfus
- Kimberly Flynn
- Steisy Gil
- Robert Gulack
- Craig Hall
- Rachel Lidov
- Caroline Martin
- Suzanne Mattei
- Jenna Orkin
- Mary Perillo
- Jo Polett
- Paul Stein

At the end of the public comment period, an additional member of the public, Eli Kent, addressed the panel and the audience with his comments. Mr. Kent was not formally recognized, as Mr. Oppelt had adjourned the meeting at 5:07 p.m. and several panel members were no longer present to hear the additional comments. These comments are included in the audio record of the meeting.

Comments received in writing are provided in Attachment B.